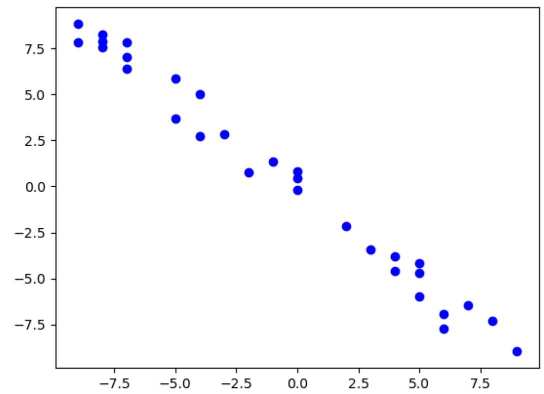
1. Determine the appropriate model for the graph of points below.



   A. Logarithmic model

   B. Linear model

   C. Exponential model

   D. Non-linear Power model

   E. None of the above

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2. A town has an initial population of 20000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	19950	19900	19850	19800	19750	19700	19650	19600	19550

   A. Logarithmic

   B. Exponential

   C. Non-Linear Power

   D. Linear

   E. None of the above

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3. Using the scenario below, model the population of bacteria α in terms

of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 4 bacteria-α. After 3 hours, the petri dish has 42366 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 21 minutes

B. About 128 minutes

C. About 41 minutes

D. About 251 minutes

E. None of the above

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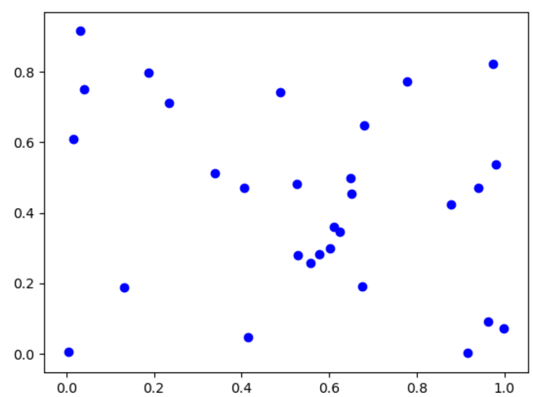
4. Determine the appropriate model for the graph of points below.



A. Linear model

B. Exponential model

C. Non-linear Power model

D. Logarithmic model

E. None of the above

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5. A town has an initial population of 50000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	49970	49940	49910	49880	49850	49820	49790	49760	49730

A. Exponential

B. Non-Linear Power

C. Logarithmic

D. Linear

E. None of the above

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6. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 190° *C and is placed into a* 12° *C bath to cool. After 22 minutes, the uranium has cooled to* 123° *C.*

A. $k = -0.03427$

B. $k = -0.03463$

C. $k = -0.02443$

D. $k = -0.06143$

E. None of the above

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7. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 712 grams of element X and after 2 years there is 101 grams remaining.

A. About 730 days

B. About 0 days

C. About 1 day

D. About 365 days

E. None of the above

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8. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

   A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 2 hours, the petri dish has 105 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

   A. About 222 minutes

   B. About 56 minutes

   C. About 37 minutes

   D. About 339 minutes

   E. None of the above

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9. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

   The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is *initially 672 grams of element X and after 6 years there is 74 grams remaining.*

A. About 730 days

B. About 2920 days

C. About 365 days

D. About 1 day

E. None of the above

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10. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 200° *C and is placed into a* 11° *C bath to cool. After 40 minutes, the uranium has cooled to* 130° *C.*

A. $k = -0.01298$

B. $k = -0.01157$

C. $k = -0.01897$

D. $k = -0.01914$

E. None of the above
